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Robbins

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[54] **FOUR POSITION FIREARM FIRE CONTROL SELECTOR**

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[21] Appl. No.: **642,912**

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[51] **Int. Cl.**^{6} **F41A 19/46**

[52] **U.S. Cl.** **89/129.02**; 89/140; 89/142

[58] **Field of Search** 89/129.02, 139–142, 89/143, 144

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,028,032	5/1912	Krag	89/142
2,383,487	8/1945	Johnson, Jr.	89/139
3,292,492	12/1966	Sturtevant	89/128
3,446,114	5/1969	Ketterer	89/140
3,715,954	2/1973	Rude, Jr.	89/127
3,724,325	4/1973	Silsby	89/149
3,774,500	11/1973	Into	89/142
3,847,054	11/1974	Ruger et al.	89/141
4,002,101	1/1977	Tellie	89/142
4,117,761	10/1978	Johnson et al.	89/140
4,697,495	10/1987	Beretta	89/143
4,833,970	5/1989	Wilhelm	89/141
5,251,533	10/1993	Layton	89/142

FOREIGN PATENT DOCUMENTS

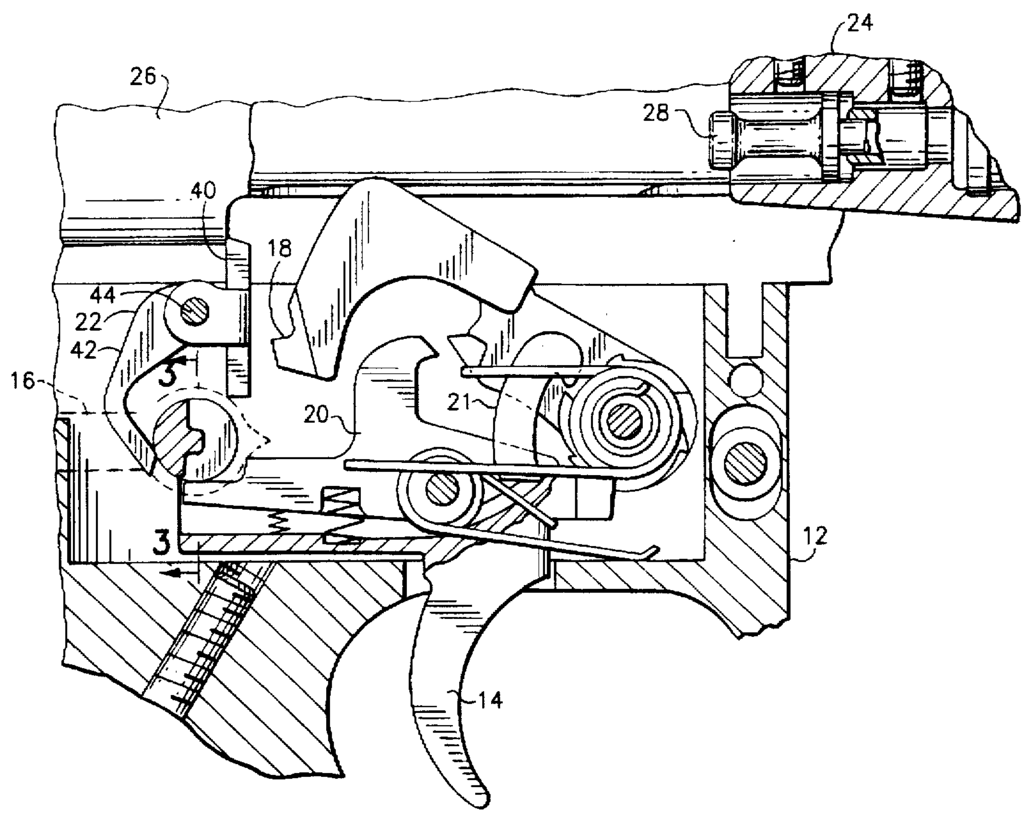
1052274 9/1956 Germany .

Primary Examiner—Michael J. Carone
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[57] **ABSTRACT**

A firearm with a trigger, a hammer, an automatic sear, and a selector switch connected to a rotatable firing control cam for selecting among types of firing selections of the firearm. The types of firing selections include safe, semi-automatic, limited automatic burst, and fully automatic. The control cam has a section with a general cross-sectional mushroom shape that is contacted by a leg from the automatic sear. The leg has a bend and extends under a center of the control cam in at least two positions of the control cam.

12 Claims, 4 Drawing Sheets



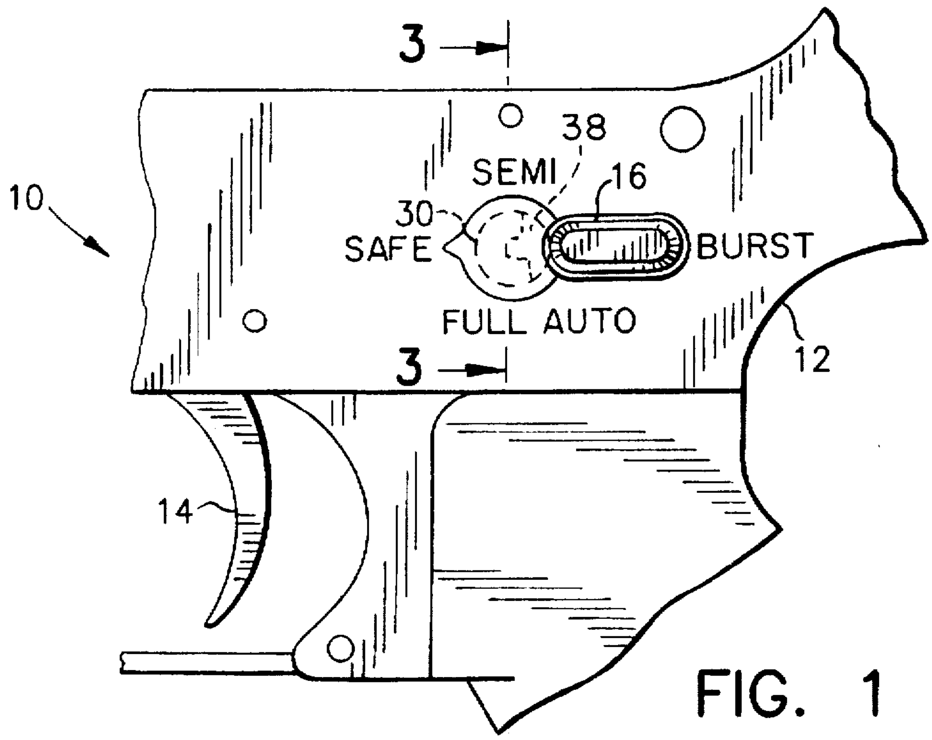

3
38
SEMI
16
10
30
SAFE
BURST
FULL AUTO
3
12
14

FIG. 1

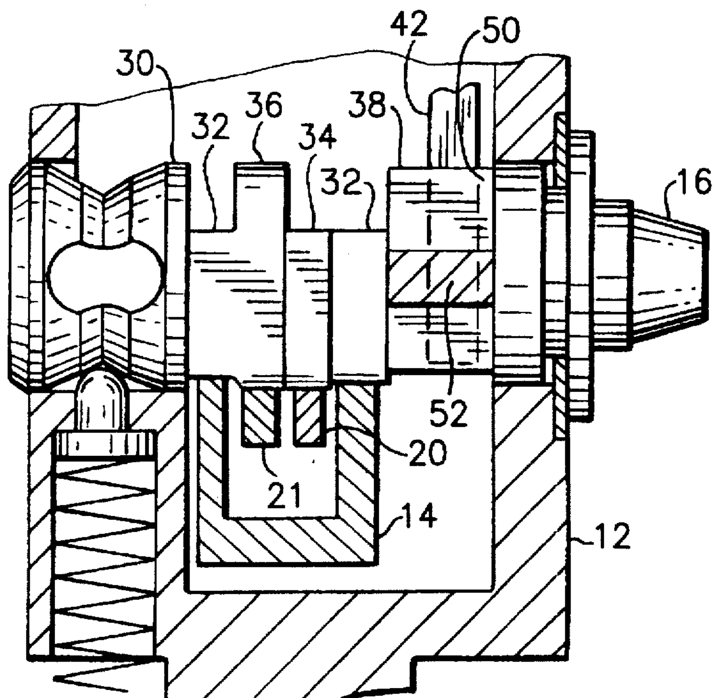

42
50
30
32
36
34
38
32
16
52
20
21
14
12

FIG. 3

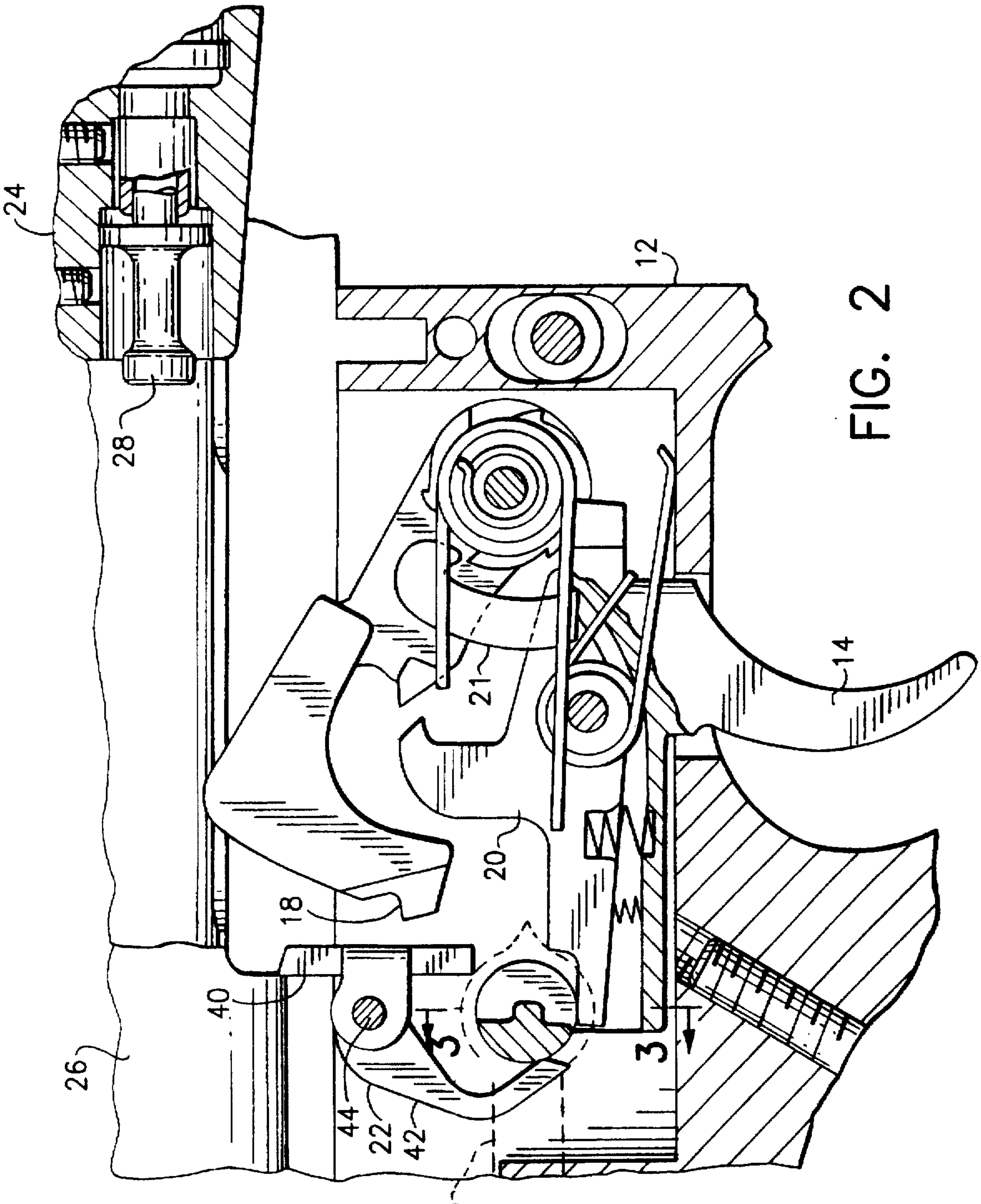


FIG. 2

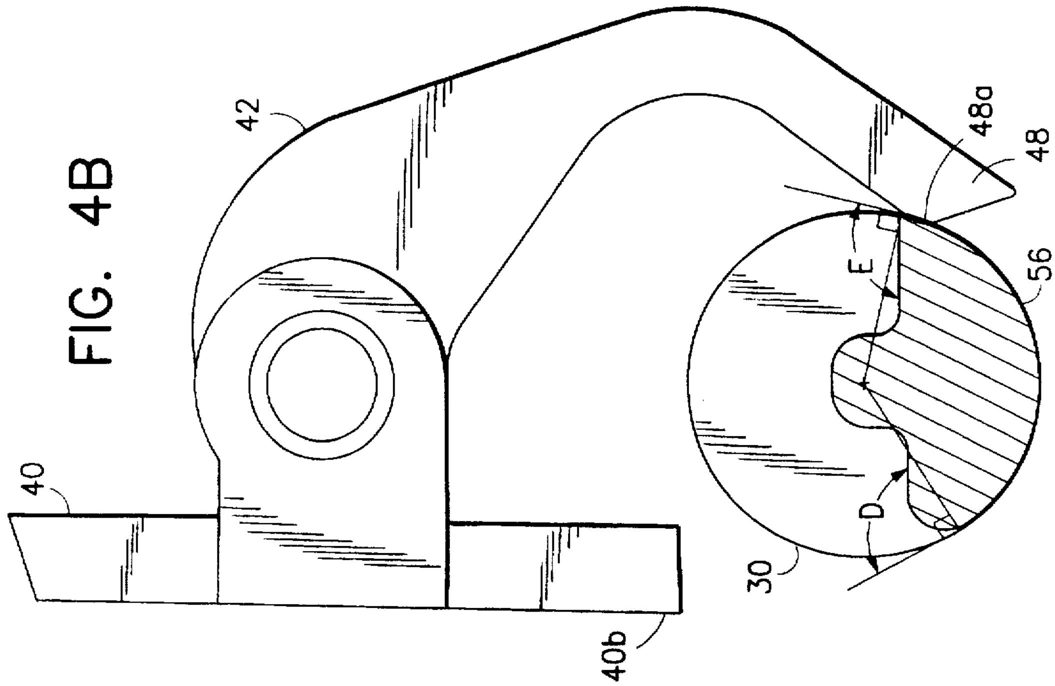

42
48a
48
56
E
D
30
40
40b

FIG. 4B

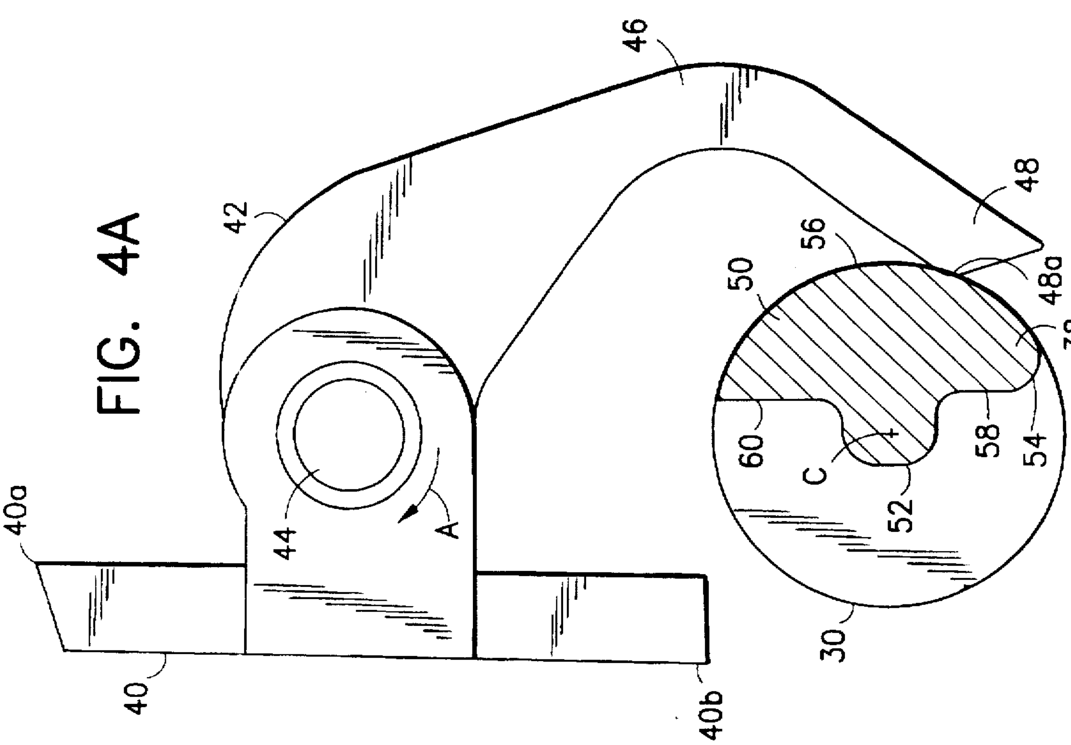

46
42
48
56
50
48a
38
60
58
54
C
52
44
A
40a
40
40b
30

FIG. 4A

FIG. 4D

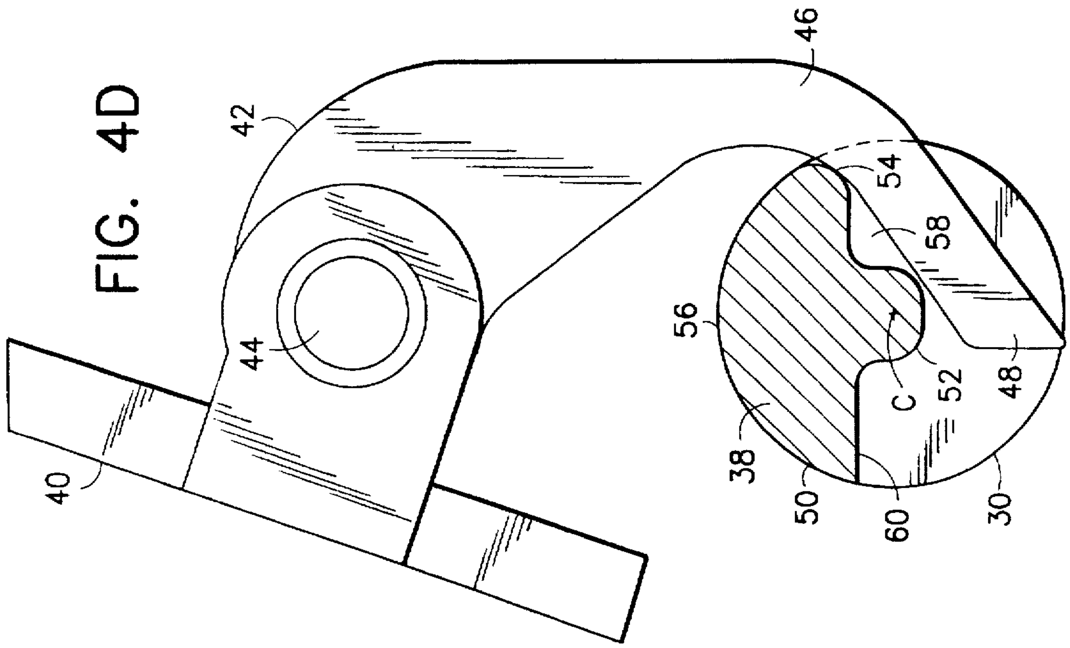
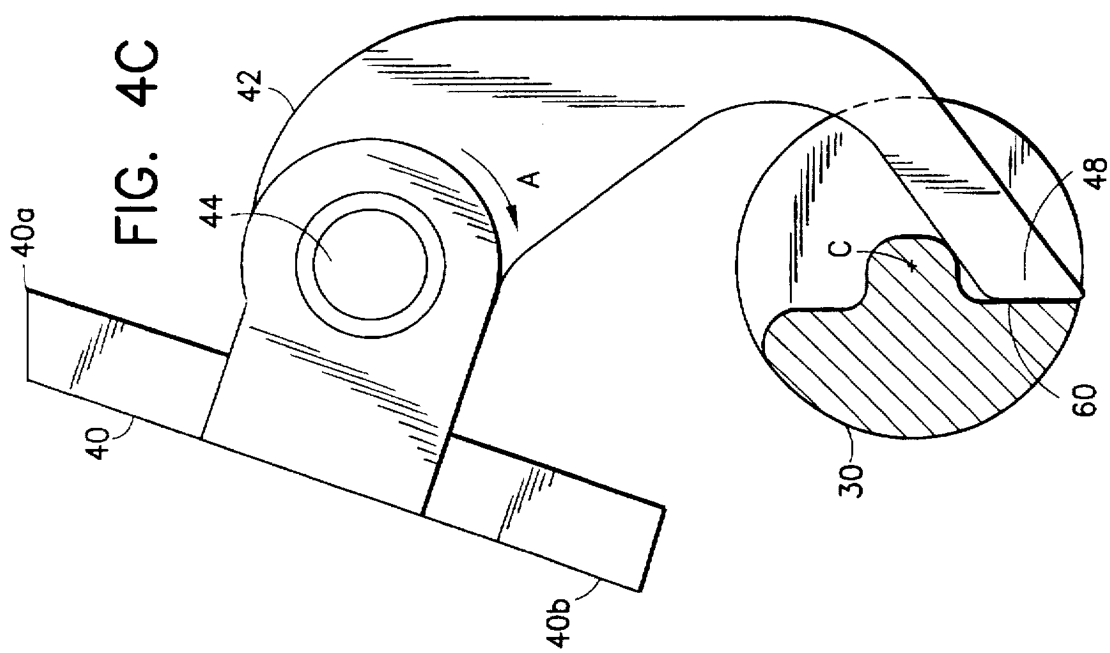


FIG. 4C



FOUR POSITION FIREARM FIRE CONTROL SELECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to firearms and, more particularly, to a firing mode selector switch.

2. Prior Art

U.S. Pat. No. 3,292,492 discloses a fire control selector that can provide four settings; safe, burst, semi-automatic and fully automatic. U.S. Pat. No. 5,251,533 shows a similar fire control selector with four settings, but using a straight angled sear leg surface and cuts angled relative to a tangent into the control cam.

SUMMARY OF THE INVENTION

In accordance with one embodiment of the present invention a firearm is provided having a trigger, a hammer, an automatic sear, and a selector switch connected to a rotatable firing control cam for selecting among types of firing selections of the firearm. The types of firing selections include safe, semi-automatic, limited automatic burst, and fully automatic. The rotatable firing control cam has an automatic sear control section that is contacted by a leg from the automatic sear. The improvement comprises the automatic sear control section of the control cam having a general mushroom cross-sectional shape with a dome section and a stem section.

In accordance with another embodiment of the present invention a firing control mechanism is provided comprising an automatic sear, a leg connected to the automatic sear, a selector switch, and a rotatable firing control cam connected to the selector switch and having the leg riding thereon. The improvement comprises the leg having a bend near a middle of the leg with the control cam contacting the leg adjacent the bend in at least one position of the control cam.

In accordance with another embodiment of the present invention a firearm is provided comprising a trigger, a hammer, an automatic sear, and a selector switch connected to a rotatable firing control cam selecting among types of firing selections of the firearm. The types of firing selections includes safe, semi-automatic, limited automatic burst, and fully automatic. The rotatable firing control cam has an automatic sear control section that is contacted by a leg from the automatic sear. The improvement comprises means for moving the control cam between a burst position and a fully automatic position without the control cam significantly moving the leg.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing aspects and other features of the invention are explained in the following description, taken in connection with the accompanying drawings, wherein:

FIG. 1 is a partial side view of a firearm incorporating features of the present invention;

FIG. 2 is a partial cross-sectional view of the firearm shown in FIG. 1;

FIG. 3 is a partial cross-sectional view of the firearm shown in FIG. 2 taken along line 3—3;

FIG. 4A is a schematic partial cross-sectional and side view of the control cam and automatic sear shown in FIG. 2 at a safe firing position;

FIG. 4B is a schematic partial cross-sectional and side view as in FIG. 4A with the control cam and automatic sear at a semi-automatic firing position;

FIG. 4C is a schematic partial cross-sectional and side view as in FIG. 4B with the control cam and automatic sear at a limited automatic burst firing position; and

FIG. 4D is a schematic partial cross-sectional and side view as in FIG. 4C with the control cam and automatic sear at a fully automatic firing position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a partial side view of a firearm **10** incorporating features of the present invention. The firearm is similar to an M16 with a lower receiver **12**, a trigger **14**, and a selector switch **16**. Although the invention will be described with reference to the single embodiment shown in the drawings, it should be understood that features of the present invention could be embodied in other different types of firearms. In addition, any suitable size, shape or type of elements or materials could be used.

Referring also to FIG. 2, the firearm **10** has a hammer **18**, a semi-automatic disconnector **20**, a burst ratchet disconnector **21**, an automatic sear **22**, and a bolt assembly **24** with a bolt carrier **26** and a firing pin **28**. Similar firing mechanisms are described in U.S. Pat. No. 3,292,492 and U.S. Pat. No. 5,251,533 which are hereby incorporated by reference in their entirety. Referring also to FIG. 3, the selector switch **16** is connected to a rotatable firing control cam **30**. The cam **30** can be axially rotated for selecting among types of firing selections of the firearm.

More specifically, as seen in FIG. 1, the selector switch **16** can be axially rotated from "SAFE" to "SEMI" to "BURST" to "FULL AUTO", and in reverse. The control cam **30** has a first section **32** for interacting with the rear end of the trigger **14**, a second section **34** for interacting with the rear end of the first disconnector **20**, a third section **36** for interacting with the rear end of the second disconnector **21**, and a fourth section **38** for interacting with the automatic sear **22** (see FIG. 2).

The automatic sear **22** includes a disconnector **40** and a leg **42** pivotally mounted on a pin **44**. As is known in the art, the bottom edge of the disconnector **40** is adapted to catch the rear of the hammer **18** and, release the hammer **18** when the top edge of the disconnector **40** is moved by the rear of the bolt carrier **26**. The disconnector **40** is substantially the same as in the prior art. Referring also to FIG. 4A, the leg **42**, however, is different. The leg **42** has a bend **46**, a bottom end **48** and a top end pivotally mounted on the pin **44**. A spring (not shown) is provided on the pin **44** and between the leg **42** and the disconnector **40** to bias the bottom end **48** of the leg **42** towards the control cam **30**. The leg **42** has a section that interacts with the disconnector **40** to limit its rotation on the pin **44** relative to the leg **42** in direction A. The control cam **30**, at the fourth section **38**, limits axial rotation of the leg **42** on pin **44** in direction A.

FIGS. 1, 2, 3 and 4A show the firearm **10** with the selector switch **16** at the "SAFE" position. The fourth section **38** forms an automatic sear control section as better understood from the description below. The control cam **30** has a general mushroom shaped cross-section at the fourth section **38**. This general mushroom shape is demonstrated best by FIG. 4D. More specifically, as seen best in FIG. 4D, the cross-sectional shape has a dome section **50** and a stem section **52**. The stem section **52** is located at a center axis C of the control cam **30** and is relatively short. The dome section **50** has an edge **54** between its curved top surface **56** and one of its undercut sections **58** that is curved. A second undercut section **60** is located on the opposite side of the stem **52**.

Although sections **58** and **60** are called undercut sections, in a preferred embodiment the cam **30** is cast of metal with the sections **58**, **60** therein. However, sections **58**, **60** could be cut out of a column of material if desired. With the cam **30** in the "SAFE" position shown in FIG. **4A**, the tip **48***a* of the leg's bottom end **48** contacts the curved surface **56**. This limits the position of the leg **42** which, in turn, limits the position of the automatic sear disconnector **40** to the substantially vertical position shown. The bottom **40***b* of the disconnector **40** is too far back to interact with the rear of the hammer **18**.

When the selector switch **16** is rotated to the "SEMI" setting, the control cam **30** is rotated to the position shown in FIG. **4B**. In this position the curved surface **56** still contacts the tip **48***a* of the leg's bottom end **48**. Thus, the control cam **30** still limits the position of the leg **42** to limit the position of the automatic sear disconnector **40** to the inoperative substantially vertical position shown.

When the selector switch **16** is rotated to the "BURST" setting, the control cam **30** is rotated to the position shown in FIG. **4C**. In this position the leg's bottom end **48** has rotated forward into the area of the second undercut section **60**. The bottom end **48** extends below and past the center axis C. Because the leg **42** has rotated on the pin **44** in direction A, the automatic sear disconnector **40** has also been allowed to rotate in direction A on the pin **44**. As seen in comparing FIG. **4C** to FIG. **4B**, the disconnector moves from its substantially vertical position to an angled position with the bottom **40***b* of the disconnector **40** in a forward position. The bottom **40***b* is thus in position to catch the hammer **18**. The top **40***a* of the disconnector **40** is in a suitable position to be moved by the bolt carrier **26**. Thus, the disconnector **40** can be moved by the bolt carrier **26** to release the hammer **18** for limited burst automatic firing in conjunction with the ratchet disconnector **21**.

When the selector switch **16** is rotated to the "FULL AUTO" setting, the control cam **30** is rotated to the position shown in FIG. **4D**. In this position the leg's bottom end **48** is in the same position shown in FIG. **4C**. The fourth section **38** is located above the bottom end **48**. The leg **42** contacts the cam **30** at the curved edge **54**. The curved edge **54** contacts the leg adjacent the bend **46** in the middle of the leg **42**. The bend **46** is located substantially horizontally even with the top dome section **50** of the control cam **30**. The automatic sear disconnector **40** has the same position in the "FULL AUTO" setting as in the "BURST" setting. As the control cam **30** is rotated between the position shown in FIG. **4C** and the position shown in FIG. **4D**, or vice versa, the control cam **30** does not significantly move the leg **42**. Therefore, the automatic sear disconnector **40** is not significantly moved. In an alternate embodiment, such as an open bolt firearm, this can prevent the automatic sear from inadvertently releasing a caught hammer.

When the selector switch **16** is rotated back to the "SAFE" position of FIG. **4A**, the curved edge **54** pushes the leg **42** backward in a direction reverse to direction A. The leg **42**, in turn, pushes the automatic disconnector **40** back to a substantially vertical position in a direction reverse to direction A. The control cam **30** can be rotated clockwise and counterclockwise to move from firing selections including safe, semi-automatic, limited automatic burst, fully automatic and back to safe or, from safe to fully automatic, to burst, to semi-automatic and back to safe. The cross-sectional shape of the fourth section **38** of the cam **30** and the shape of the leg **42** have been designed to provide this feature. As seen in looking at FIGS. **4A–4D**, the bottom end **48** contacts the curved surface **56** of the dome **50** in two positions of the cam **30**; FIGS. **4A** and **4B**. The bottom end **48** contacts the bottom of the dome **50** at undercut area **60** in one position of the cam **30**; FIG. **4C**. The bottom end **48** does not contact fourth Section **38** in one position; FIG. **4D**. Rather, the leg **42** contacts the cam **30** adjacent the bend **46** in the position shown in FIG. **4D**. As seen in FIG. **4B**, the main part of the first undercut section **58** is angled relative to the tangent at an angle D of about 104°. The second undercut section **60** is angled relative to the tangent at an angle E of about 102°. In alternate embodiments other types of angles could be provided. The cross-sectional shape of the fourth section **38** provides a sufficiently large cross-sectional area to provide good strength for the cam **30** at the area **38**. This strength will prevent the cam **30** from being damaged from repeated and perhaps roughed use. The present invention also provides a four position firearm selector that does not infringe U.S. Pat. No. 5,251,533.

It should be understood that the foregoing description is only illustrative of the invention. Various alternatives and modifications can be devised by those skilled in the art without departing from the spirit of the invention. Accordingly; the present invention is intended to embrace all such alternatives, modifications and variances which fall within the scope of the appended claims.

What is claimed is:

1. In a firearm having a trigger, a hammer, an automatic sear, and a selector switch connected to a rotatable firing control cam for selecting among types of firing selections of the firearm, the types of firing selections including safe, semi-automatic, limited automatic burst, and fully automatic, the rotatable firing control cam having an automatic sear control section that is contacted by a leg from the automatic sear, wherein the improvement comprises:

the automatic sear control section of the control cam having a general mushroom cross-sectional shape with a dome section and a stem section.

2. A firearm as in claim **1** wherein the stem section is located at a center of the control cam and is shorter than the dome section.

3. A firearm as in claim **1** wherein one edge of the dome section between a curved top surface and an undercut section is curved.

4. A firearm as in claim **1** wherein the control cam has two undercut sections located on opposite sides of the stem section.

5. A firearm as in claim **1** wherein the leg has a bend near a middle of the leg with the control cam contacting the leg adjacent the bend in at least one position of the control cam.

6. A firearm as in claim **1** wherein the leg has a bottom end that extends below a center of the control cam in at least one position of the control cam.

7. In a firing control mechanism having an automatic sear, a leg connected to the automatic sear, a selector switch, and a rotatable firing control cam connected to the selector switch and having the leg riding thereon, wherein the improvement comprises:

the leg having a bend near a middle of the leg with the control cam contacting the leg adjacent the bend in at least one position of the control cam, wherein the means for moving comprises an automatic sear control section of the control cam having a general mushroom shape.

8. A firing control mechanism as in claim **7** wherein the leg has a bottom end that extends below a center of the control cam in at least one position of the control cam.

9. A firing control mechanism as in claim **8** wherein the leg has a bottom end that extends below a center of the control cam in at least two positions of the control cam.

10. In a firearm having a trigger, a hammer, an automatic sear, and a selector switch connected to a rotatable firing control cam for selecting among types of firing selections including safe, semi-automatic, limited automatic burst, and fully automatic, the rotatable firing control cam having an automatic sear control section that is contacted by a leg from the automatic sear, wherein the improvement comprises:

means for moving the control cam between a burst position and a fully automatic position, wherein the means for moving comprises the control cam having a general cross-section mushroom shape.

11. A firearm as in claim 10 wherein the leg has a bend located substantially horizontally even with a top section of the control cam.

12. A firearm as in claim 11 wherein the leg has a bottom end for contacting the control cam in two positions of the control cam.

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